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                  *Teaching Guides
IDENTIFIERS   ESEA Title III

ABSTRACT
              Presented in this teacher's guide for grades 10-12
are lesson plans and ideas for integrating mathematics and
environmental education. Each lesson originates with a fundamental
concept pertaining to the environment and states, in addition, its
discipline area, subject area, and problem orientation. Following
this, behavioral objectives and suggested learning experiences are
outlined. Behavioral objectives include cognitive and affective
objectives and skills to be learned, while learning experiences list
student-centered in-class activities and outside resource and
community activities. Space is provided for teachers to note resource
and reference materials--publications, audio-visual aids, and
community resources. The guides are supplementary in nature and the
lessons or episodes are designed to be placed in existing course
content at appropriate times. This work was prepared under an ESEA
Title III contract for Project I-C-E
(Instruction-Curriculum-Environment). (BL)

Project I - C - E   INSTRUCTION - CURRICULUM - ENVIRONMENT

A SUPPLEMENTARY PROGRAM FOR ENVIRONMENTAL EDUCATION

DISCIPLINE AREA Mathematics   GRADE 10-12

Robert Warpinski, Dire
Robert Kellner, Asst.
George Howlett, EE Spe

RY PROGRAM FOR ENVIRONMENTAL EDUCATION

EA Mathematics   GRADE 10-12

r Title III E.S.E.A.

ls in CESA 3-8-9
eet

Dire   sconsin   54301   Robert Warpinski, Director
st.   8   Robert Kellner, Asst. Director
S   , 1972 - 468-7464)   George Howlett, EE Specialist

PREFACE

"Oikus" for house is the Greek origin of the term "ecology".
studies our house--whatever or wherever it may be. Like an un
expand or contract to fit many ranges--natural and man-made.
environments, our many "houses" if we omit rancor and cite lon
complexities. Cur "oikus" uses the insights of all subjects.
multidisciplinary program like ours necessarily results. Also
a long time, our program ranges K thru 12. The environment mi
values. These values have their origin in the "oikus" of our
minds. Let us become masters of our house by replacing the G:
with "Know thyself and thine house."

1. Written and designed by your fellow teachers, this guide is
   to fit appropriately into existing, logical course content.
2. Each page or episode offers <u>suggestions</u>. Knowing your stud
   to <u>adapt</u> or <u>adopt</u>. Limitless chances are here for your expe
   Many episodes are self contained, some open-minded, still o
   developed over a few days.
3. <u>Try these episodes</u>, but <u>please pre-plan</u>. Why? Simply, no
   and no curriculum will work unless viewed in the context of
4. <u>React</u> to this guide with scratch ideas and notes on the epi
5. After using an episode, <u>fill out the attached evaluation fo</u>
   duplicate, or request more of these forms. Send them singly
   We sincerely want your reactions or suggestions--negative an
   <u>evaluations are the key</u> in telling us "what works" and in a
   the guides.

TERMS AND ABBREVIATIONS

ICE RMC is <u>Project ICE Resource Materials Center</u> serving all
school districts in CESA 3, 8, and 9. Check the Project ICE B
resources. Cur address and phone number is on this guide's cov
or call us for any materials or help.

BAVI is Bureau of Audio Visual Instruction, 1327 University A
Madison, Wisconsin 53701 (Phone: 608-262-1644).

Cognitive means a measurable mental skill, ability, or proces
Affective refers to student attitudes, values, and feelings.

PREFACE

...ikus" for house is the Greek origin of the term "ecology". Environmental education ...ies our house--whatever or wherever it may be. Like an umbrella, our house can ...nd or contract to fit many ranges--natural and man-made. We can add quality to our ...ronments, our many "houses" if we omit rancor and cite long range gains, costs, and ...lexities. Cur "oikus" uses the insights of all subjects. Thus, a rational, positive, ...idisciplinary program like ours necessarily results. Also, since attitudes grow over ...ng time, our program ranges K thru 12. The environment mirrors our attitudes or ...es.. These values have their origin in the "oikus" of our collective and individual ...s. Let us become masters of our house by replacing the Greek adage of "Know thyself" ..."Know thyself and thine house."

...ritten and designed by your fellow teachers, this guide is <u>supplementary</u> in nature-- ...o fit appropriately into existing, logical course content. ...ach page or episode offers <u>suggestions</u>. Knowing your students best, you decide what ...o <u>adapt</u> or <u>adopt</u>. Limitless chances are here for your experimentation and usage. ...any episodes are self contained, some open-minded, still others can be changed or ...eveloped over a few days. ...ry these episodes, but <u>please pre-plan</u>. Why? Simply, no guide has all the answers, ...nd no curriculum will work unless viewed in the context of your students. ...eact to this guide with scratch ideas and notes on the episode pages. ...fter using an episode, <u>fill out the attached evaluation form</u> in the back. Use, ...uplicate, or request more of these forms. Send them singly or collectively to us. ...e sincerely want your reactions or suggestions--negative and positive. <u>Your</u> ...valuations are the key in telling us "what works" and in aiding our revisions of ...he guides.

...MS AND ABBREVIATIONS

...E RMC is <u>Project ICE Resource Materials Center</u> serving all public and non-public ...ol districts in CESA 3, 8, and 9. Check the Project ICE Bibliography of available ...rces. Cur address and phone number is on this guide's cover. Feel free to write ...ill us for any materials or help. ...VI is Bureau of Audio Visual Instruction, 1327 University Avenue, P. C. Box 2093, ...on, Wisconsin 53701 (Phone: 608-262-1644). ...gnitive means a measurable mental skill, ability, or process based on factual data. ...ective refers to student attitudes, values, and feelings.

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of the Supplementary Environmental Education Guides:

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<table>
<tr><td>C
O
N
C
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P
T</td><td>1. Energy from the sun, the basic

source of all energy, is converted

through plant photosynthesis into a

form all living things can use for life processes.</td><td>Discipline Area   Math

Subject   Geometr
         Man-ma
Problem Orientation Natural</td></tr>
</table>

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EXPE
Cognitive: The student will identify various geometric forms in nature and man-designed structures. Affective: The students will appreciate the organization of natural and man-made geometric forms found in their community. Skills to be Learned Symmetry a. bilateral b. radial Asymmetrical Geometric shapes Identification	I. Student-Centered in class activity A. Review some of the basic geometric forms in class. B. Review the idea of symmetry and asymmetrical in class. 1. Have the students identify various lines of symmetry on geometric figures. C. Have the students bring some small natural objects like a blade of grass, leaves of different trees, flowers, stones and trigs to class to recognize lines of symmetry, if these objects possess any.

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rgy from the sun, the basic	Discipline Area	Math
of all energy, is converted	Subject	Geometry
h plant photosynthesis into a	Problem Orientation	Man-made and Natural Forms Grade 10

ll living things can use for life processes.

	ORAL OBJECTIVES	SUGGESTED LEARNING EXPERIEI
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tion | I. Student-Centered in class
   activity
   A. Review some of the basic
      geometric forms in class.
   B. Review the idea of symmetry
      and asymmetrical in class.
      1. Have the students identify
         various lines of symmetry
         on geometric figures.
   C. Have the students bring some
      small natural objects like a
      blade of grass, leaves of
      different trees, flowers,
      stones and twigs to class to
      recognize lines of symmetry,
      if these objects possess any. | II. Outside source and
    Community Activities
    A. A field trip through
       your community,
       especially to a city
       park.
       1. Observe large
          natural things like
          trees and clouds.
          Sketch these
          observations.
       2. Select several
          buildings and look
          at it from different
          points of view.
          Sketch silhouettes
          of the buildings.
    B. Compare the natural
       and man-made forms.
    C. Repeat these observa-
       tions at different
       times of the year and
       sketch your observations.
       Compare your results
       to various seasons of
       the year. |

Resource and Reference Materials	Continued and Additional Suggested Lea
Publications: Geometry text U.S. Dept of Agri., The Community School Site - A Laboratory for Learning, I-C-E RMC Audio-Visual: Investigations in Ecology, I-C-E RMC Grassland Ecology, #3966 BAVI Symmetry, #7882 BAVI Community: City park	

d Lea	e Materials	Continued and Additional Suggested Learning Experiences
	e Community atory for	
	ogy,	
	66 BAVI	

C O N C E P T	4. An adequate supply of pure water is essential for life.	Discipline Area ___ Math
		Subject ___ Geometry
		Problem Orientation Water Tab...

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EXLER...
Cognitive: Students will compile and graph data as a result of previous research and hypothesize the needs of a community.	I. Student-Centered in class activity
	A. Gather data on water table depths and how they vary during the year.
	B. Construct graphs using the data collected.
Affective: Students should feel he has made ... some worthwhile conclusions and recommendations for future conservation or wise use of water.	C. Hypothesize the future needs of the community based on present demands.
Skills to be Learned	
Graphing points	
Drawing conclusions	
Assimilate data	
Interpret information	
Research	
Interviews	

II. Out...
Comm...
A. ...
B. ...
C. ...
D. ...

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te supply of pure

ential for life.

Discipline Area ___Math___

Subject ___Geometry___

Problem Orientation Water Tables ___Grade 10___

ECTIVES	SUGGESTED LEARNING EXPERIENCES	

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ation
	I. Student-Centered in class
	   activity
	  A. Gather data on water table
	     depths and how they vary
	     during the year.
	  B. Construct graphs ι sing
	     the data collected.
	  C. Hypothesize the future
	     needs of the community
	     based on present demands.
		II. Outside Resource and
		    Community Activities
		  A. Visit water department
		     of community to
		     secure information
		     from records on water
		     demands at different
		     times of the year.
		  B. Observe well drilling
		     operations.
		  C. Make rain gauges and
		     chart information
		     for several months.
		  D. Go to nearest weather
		     station and get their
		     data to compare with
		     that gathered by the
		     students.

Resource and Reference Materials	Continued and Additional Suggested Learning Expe
140 So Soil Conservation Society of America, Water Use: Principles and Guidelines for Planning and Manage-in Wisconsin, I-C-E RMC	

Audio-Visual:
City Water Supply #0433   BAVI
Water Supply, #2384   BAVI
Water, #3994   BAVI
Conserving Our Water Resources Today, #5367   BAVI

Community:

Expe	Materials	Continued and Additional Suggested Learning Experiences
	Society of nciples and and Manage-	
	BAVI VI esources	

C
O
N 5. An adequate supply of clean air   Discipline Area   Math
C
E is essential because most organisms   Subject   Geomet
P   Facts
T depend on cxygen, through respiration, Problem Orientation Opinio

    to release the energy in their food.

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EXF	

Cognitive: The student will write and explain true and false statements using basic ecological facts.	I. Student-Centered in class activity
	A. Problem 1
	  Given:
	  1. The amount of dustfall is larger where the population is more dense, such as large cities.
		II.
		C
		/

Affective: The student will desire to gather more facts on air pollution.	2. Dustfall is greater during daylight hours because of the number of industries and automobiles in operation.	B
Skills to be learned Sentence writing Compound sentences True-false statements	3. Dustfall is greater on weekdays than on weekends, largely because of industrial activity. 4. Dustfall is two or three times heavier in winter than in summer.. The greater dustfall in winter is the result of the burning of coal, oil and other fuels for heat. Statements: 1. A true sample of dustfall will be obtained at night on the weekend in summer. Explain. (cont.)	

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adequate supply of clean air   Discipline Area _____ Math

sential because most organisms   Subject _____ Geometry

d on cxygen, through respiration, Problem Orientation | Facts vs Opinions   Grade 10

lease the energy in their food.

IORAL OBJECTIVES	SUGGESTED LEARNING EXPERIENCES	

e: The student te and explain false statements sic ecological
 	
e: The student ire to gather ts on air n:
 	
o be learned writing sentences se statements
	I. Student-Centered in class activity
	  A. Problem 1
	    Given:
	    1. The amount of dustfall is larger where the population is more dense, such as large cities.
	    2. Dustfall is greater during daylight hours because of the number of industries and automobiles in operation.
	    3. Dustfall is greater on weekdays than on weekends, largely because of industrial activity.
	    4. Dustfall is two or three times heavier in winter than in summer. The greater dustfall in winter is the result of the burning of coal, oil and other fuels for heat.
	    Statements:
	    1. A true sample of dustfall will be obtained at night on the weekend in summer. Explain. (cont.)
		II. Outside Resource and Community Activities
		  A. Have the students take a dustfall sample in the industrial area and compare it to a sample from a residential area.
		  B. Discuss the various types of areas that make up a community, check or compare the air pollution in each section. Is there a difference in the air? How much? What statements can be concluded from this experiment?

Resource and Reference Materials	Continued and Additional Suggested Learning E〉

Publications:
Air Pollution, Charles Lavaroni
  & Patrick O'Donnell,
  Addison-Wesley, 1971
	I. (cont.)
	  2. A true sample will be obtained at noo〈
	    Wednesday in January. Explain
	  Discussion:
	  1. How would a true or average dustfall
	    for an area?
	  2. When would the highest sample be obta〈
	    lowest sample?
	B. Problem 2
	  Given:
	  1. A man can live without water for five〈
	    can live without food for five weeks〈
	    can live without air for only five mi〈

Audio-Visual:
Poisoned Air, 50 min. discussion
  Carousel Films, Inc.
  1501 Broadway
  New York, N.Y. 10035
Air Pollution: Take a Deep Deadly
  Breath, (3 parts, 54 min., free)
  National Medical Audio-Visual
  Center, Chamblee, Ga. 30005
The Runaround, 13 min. (free)
  Wis. Tuberculosis & Respiratory
  Disease Assoc. Publication Dept.
  Box 424
  Milwaukee, Wi. 53201
	2. To maintain his health, each day the〈
	    must consume about:
	    a. 4.5 pounds of water
	    b. 2.8 pounds of food
	    c. 30 pounds of air
	Write three false statements from the ab〈
	ecological facts. At least one statemer〈
	be a compound sentence.
	Write three true statements from the abo〈
	ecological facts. At least one statemer〈
	be a compound sentence.

Community: City Health Dept.	

ng Ex[ce Materials	Continued and Additional Suggested Learning Experiences
t noc[les Lavaroni[1,[71	I. (cont.) 2. A true sample will be obtained at noon on Wednesday in January. Explain
fall	Discussion: 1. How would a true or average dustfall be determined for an area?
obta	2. When would the highest sample be obtained? The lowest sample?
	B. Problem 2
	Given:
five[eeks[ve m[the	1. A man can live without water for five days. He can live without food for five weeks, but he can live without air for only five minutes.

h. discussion[e.	2. To maintain his health, each day the average man must consume about:
	      a. 4.5 pounds of water
	      b. 2.8 pounds of food

35	c. 30 pounds of air
he ab[a Deep Deadly[temen[54 min., free)[udio-Visual	Write three false statements from the above given ecological facts. At least one statement should be a compound sentence.
e abc[a. 30005[temen[n. (free)[Respiratory[ication Dept.	Write three true statements from the above given ecological facts. At least one statement should be a compound sentence.
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6. Natural resources are not equally   Discipline Area _____

distributed over the earth or over   Subject _____

time and greatly affect the geographic Problem Orientation

conditions and quality of life.

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNI
Cognitive: Students will be able to list and describe 5 kinds of dams and also 5 reasons for building dams. Affective: Students will appreciate how much study and research goes into building a dam and how the entire ecology can be changed by construction of a dam. Skills to be Learned Practical use for geometric constructions Understanding of how geometry and trig. are used in construction Drawing plans according to a scale teaches ratio and proportion	I. Student-Centered in class activity A. Students will study different types of dams and their uses. 　1. Masonry dams 　　a. Hollow dams 　　b. Buttress dams 　　c. Multiple arch dams 　2. Embankment dams 　　a. Earth-fill 　　b. Semi-hydraulic fill and hydraulic fill 　　c. Rock fill 　3. Timber dams 　4. Gravity dams 　5. Overflow dams B. Students work in small groups and first draw the plans and then construct models of various types of dams. (This could be given as an "A" contract.) If everyone did not participate, a special class could be devoted to explanations of the various drawings or models. C. The instructor should point out various types of geometric constructions used in making d

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tural resources are not equally   Discipline Area ____ Math _____

ibuted over the earth or over   Subject _____ Geometry - Constructions and
                                                            Trigonometry
and greatly affect the geographic Problem Orientation Dams & the EcologyGrade 10

tions and quality of life.

ORAL OBJECTIVES	SUGGESTED LEARNING EXPERIENCES	

: Students will
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5 kinds of dams
5 reasons for
dams.
 	
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	I. Student-Centered in class
	   activity
	   A. Students will study
	      different types of dams
	      and their uses.
	      1. Masonry dams
	         a. Hollow dams
	         b. Buttress dams
	         c. Multiple arch dams
	      2. Embankment dams
	         a. Earth-fill
	         b. Semi-hydraulic fill
	            and hydraulic fill
	         c. Rock-fill
	      3. Timber dams
	      4. Gravity dams
	      5. Overflow dams
	   B. Students work in small
	      groups and first draw the
	      plans and then construct
	      models of various types of
	      dams. (This could be given
	      as an "A" contract.) If
	      everyone did not participate,
	      a special class could be
	      devoted to explanations of the
	      various drawings or models.
	   C. The instructor should point
	      out various types of geometric
	      constructions used in making dams.
		II. Outside Resource and
		    Community Activities
		    A. Visit a dam in the
		       vicinity. Find:
		       1. Cost of construc-
		          tion.
		       2. How did it change
		          the environment?
		          a. Economically
		          b. Aesthetically
		       3. Was it necessary
		          to relocate?
		          a. Homes
		          b. Highways
		          c. Utilities
		       4. What were the
		          advantages to the
		          area?
		       5. What were the
		          disadvantages?
		    B. When travelling or
		       visiting other areas,
		       the large dams are
		       always a feature of
		       extreme interest.
		       Students should be
		       interested in finding
		       out the reasons for
		       the particular dam.
		              (cont.)

Resource and Reference Materials	Continued and Additional Sugges
Publications:	II. (cont.)
Any encyclopedia	1. Stop flow of water in ri
Brochures from any of the large	2. Raise the water level.
dams by writing to the	3. Stored water produces hy
authorized places.	4. Release at a certain tim
	all times in certain riv
	The wildlife, fish, etc.
	5. Irrigation to change wor
	productive land, etc.
Audio-Visual:	
Dams, #4688 BAVI	
Community:	
Visit to a local dam	

gges	erence Materials	Continued and Additional Suggested Learning Experiences
n ri		II. (cont.)
l.	ny of the large	1. Stop flow of water in river or stream.
s hy	to the	2. Raise the water level.
tim	es.	3. Stored water produces hydro-electric power.
riv		4. Release at a certain time to assure water at
etc.		all times in certain rivers which may dry up.
wor		The wildlife, fish, etc. can thus be saved.
		5. Irrigation to change worthless land into
		productive land, etc.
	I	
	cam	

C O N C E P T	7. Factors such as facilitating transportation, economic conditions, population growth, and increased leisure time have a great influence on changes in land use and centers of population density.	Discipline Area ___Math___ Subject ___Geometry___ Problem Orientation ___Land Uses___

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EXPERIENCE

Cognitive: Students will construct a map drawn to scale of an area to illustrate what objects are found in that particular area. The maps will be constructed by a method called triangulation.
 	
Affective: The students will appreciate the use of maps and how they aid an ecologist in identifying land uses.
 	
Skills to be Learned
Using a compass
Scale drawing
Construction of a sextant
	I. Student-Centered in class activity
	A. Review in class:
	  1. Define what an angle is.
	  2. Different kinds of angles like acute, obtuse, etc.
	  3. A protractor, the scale on a protractor and how to read this scale.
	  4. Review scale drawings and how they are used on different maps, the globe, pictures in books.
	B. Description of the procedure used in map-making by triangulation.
	  1. Mark a "base line" with 2 stakes and a string on one side of your area. The distance between the 2 stakes is selected by the individual, and it is suggested that the distance represents a length which can easily be converted to scale drawing. Label one stake "A" and the other "B". Attach a string to the top of the 2 stakes as a "base line". Using a protractor
	(cont.)

II. Outside R
    Community
    A. Constr
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       3. Can
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          tea

ESEA Title III - 59-70-0135-2 Project I-C-3

acilitating	Discipline Area	Math
mic conditions,	Subject	Geometry
id increased	Problem Orientation	Land Uses Grade 10

reat influence
e and centers of population density.

SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity	II. Outside Resource and Community Activities

A. Review in class:
  1. Define what an angle is.
  2. Different kinds of angles like acute, obtuse, etc.
  3. A protractor, the scale on a protractor and how to read this scale.
  4. Review scale drawings and how they are used on different maps, the globe, pictures in books.
B. Description of the procedure used in map-making by triangulation.
  1. Mark a "base line" with 2 stakes and a string on one side of your area. The distance between the 2 stakes is selected by the individual, and it is suggested that the distance represents a length which can easily be converted to scale drawing. Label one stake "A" and the other "B". Attach a string to the top of the 2 stakes as a "base line". Using a protractor (cont.)
	A. Construct the experiment which was described in class activity, part B.
	  1. Students can do this in their own yard. Allow the students a week to complete their map.
	  2. The same experiment can be conducted in the city park, rural areas, etc.
	  3. Can also be conducted in school yard under the supervision of the teacher.

Resource and Reference Materials	Continued and Additional Suggested Learnin

Publications:
110 Un Introducing Measurement,
      Unit 5, Minnesota Math &
      Science Teaching Project,
      I-C-E RMC
FM 21-26 Map Reading, Dept. of
      the Army Field Manual,
      I-C-E RMC
 	
Audio-Visual:
  Investigations in Ecology,
  I-C-E RMC
  Don't Crowd Me, #7628 BAVI
  Litter Monster, #3978 BAVI
  Man Uses and Changes the Land,
  #6889 BAVI
	I. (cont.)
	  at stake "A", select an object in the a
	  measure the angle of the object to the
	  Zero on the protractor represents the "
	  (string). Record this angle measure.
	    Go to stake "B" and record the angle
	  object and the "base line".
	    Follow the same procedure with other
	  area that you want to map. Be sure to r
	  angle measurements of objects at the tw
	    A scale drawing of the area can be co
	  using the selected scale and the angle
	  which you obtained.
	  Note: A sextant could be used in place
	      in this episode.

Community:
Visit to city park

ence Materials	Continued and Additional Suggested Learning Experiences
Measurement, esota Math & hing Project, g, Dept. of Id Manual, cology, 28 BAVI 78 BAVI s the Land,	I. (cont.) at stake "A", select an object in the area and measure the angle of the object to the "base line". Zero on the protractor represents the "base line" (string). Record this angle measure. Go to stake "B" and record the angle from the same object and the "base line". Follow the same procedure with other objects in the area that you want to map. Be sure to record the angle measurements of objects at the two stakes. A scale drawing of the area can be constructed by using the selected scale and the angle readings which you obtained. Note: A sextant could be used in place of a compass in this episode.

C	8. Cultural, economic, social and	Discipline Area	Math
O			
N	political factors determine status	Subject	Geometry
C			An economi
E	of man's values and attitudes	Problem Orientation	factor
P			
T	toward his environment.		

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EXPERIENC

Cognitive: The student will use coordinate geometry to determine points or positions in two dimensions.
 	
Affective: The student should appreciate that locating positions can be conducted on a small scale, like locating a point or on a large scale like describing a position of a star.
 	
Skills to be Learned
1. Locating points (graphing)
2. Using positive and negative integers
	I. Student-Centered in class activity
	A. Class review:
	  1. Define a point and plane
	  2. On a plane, draw the horizontal line or x-axis and a vertical line which is the y-axis. Review the idea of positive and negative integers in reference to the two axes. Select two integers and plot this point on paper (graph paper preferred) in reference to the two axes.
	  NOTE I: The two axes intersect at a point called the origin.
	  NOTE II: The two numbers selected are called ordered pairs
	B. Plot the following ordered pairs on graph paper and connect the points in order.
	  1. (-4,-5) 6. (0,-6)
	  2. (-3.4,-5.5) 7. (2,-6)
	  3. (-3,-5.8) 8. (2.5,-5.9)
	  4. (-2.5,-5.9) 9. (3,-5.8)
	  5. (-2,-6) 10. (3.5,-5.5)
	                    (cont.

omic, social and	Discipline Area	Math		
determine status	Subject	Geometry		
nomi ad attitudes	Problem Orientation	An economic factor	Grade	10
ment.				

IENCE	'ES	SUGGESTED LEARNING EXPERIENCES	

<table>
<tr><td colspan="2">ent will
try to
positions</td><td>I.   Student-Centered in class
    activity
  A. Class review:</td><td>II. Outside Resource and
   Community Activities</td></tr>
</table>

I.   Student-Centered in class
     activity

A. Class review:
1. Define a point and plane
2. On a plane, draw the
   horizontal line or x-axis
   and a vertical line which
   is the y-axis. Review the
   idea of positive and neg-
   ative integers in refer-
   ence to the two axes.
   Select two integers and
   plot this point on paper
   (graph paper preferred)
   in reference to the two
   axes.

NOTE I: The two axes inter-
sect at a point called the
origin.

NOTE II: The two numbers
selected are called ordered
pairs

B. Plot the following ordered
   pairs on graph paper and
   connect the points in order.
   1. (-4,-5)   6. (0,-6)
   2. (-3.4,-5.5) 7. (2,-6)
   3. (-3,-5.8)   8. (2.5,-5.9)
   4. (-2.5,-5.9) 9. (3,-5.8)
   5. (-2,-6)   10. (3.5,-5.5)
                      (cont.

II. Outside Resource and
    Community Activities

A. Take a field trip
   to the sanitary
   landfill in your
   community. Discuss
   the effect of re-
   cycling for the
   items observed in
   the landfill site.
   (The relationship
   of the idea with
   the student activ-
   ity is that the
   answer for Part B
   is a can.)

B. The city's sanita-
   tion engineer can
   give a talk to the
   class on the land-
   fill sites in the
   area, recycling in
   the community and
   other related
   topics.

Left margin (partial):
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ting positions
a small scale,
t or on a
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Resource and Reference Materials	Continued and Additional Suggested
Publications:	I. (cont.)
Pollution: Problems, Projects and	11. (4,-5) 22. (-3
Mathematical Exercise, Wisconsin	12. (4,0) 23. (-4
Department of Public Instruction	13. (4,6) 24. (-3
	14. (3.5,6.5) 25. (-3
	15. (3,6.8) 26. (-2
	16. (2.5,6.9) 27. (-2
	17. (2,7) 28. (2,
	18. (0,7) 29. (2.
	19. (-2,7) 30. (3,
Audio-Visual:	20. (-2.5,6.9) 31. (3.
Film #0822 - "Geometry in Action"-	21. (-3,6.8) 32. (4,
($2.00)-BAVI-1940	
	Connect (-4,6) to (-4,-5)
Film #7251-7252 - "What Are We Doing	What polluting article does thi
to Our World?"-($21.00)-BAVI-1970	
	NOTE: The information presente
	taken from page 48 in th
	Pollution.
Community:	
Sanitation engineer for your community	
Visit to community landfill site	

sted	Materials	Continued and Additional Suggested Learning Experiences

I. (cont.)

11. (4,-5)	22. (-3.5,6.5)
12. (4,0)	23. (-4,6)
13. (4,6)	24. (-3.5,5.5)
14. (3.5,6.5)	25. (-3,5.2)
15. (3,6.8)	26. (-2.5,5.1)
16. (2.5,6.9)	27. (-2,5)
17. (2,7)	28. (2,5)
18. (0,7)	29. (2.5,5.1)
19. (-2,7)	30. (3,5.2)
20. (-2.5,6.9)	31. (3.5,5.5)
21. (-3,6.8)	32. (4,6)

Connect (-4,6) to (-4,-5)
What polluting article does this represent?

NOTE: The information presented in this chart was
taken from page 48 in the book entitled
Pollution.

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sconsin
ruction

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(-3
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community
site

C 9. Man has the ability to manage,	Discipline Area Mat
O	
N manipulate, and change his	Subject Geo
C	
E environment.	Problem Orientation W
P	
T	

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING	
Cognitive: Using research methods, students will find out various ways in which water sheds, are managed and used to change man's environment.	I. Student-Centered in class activity	II. O Co
	A. List as many ways as possible of man's use of water shed control.	A.
	1. Use library	B.
Affective: Students should advocate or reject man's use of water, shed management for his immediate and material gains	2. Report on different programs	
	3. Evaluate the worth of existing programs	C.
	4. Discuss pros and cons (Buzz groups)	
	B. Construct drawings using geometric designs of water shed management areas, showing use of land.	
Skills to be Learned	C. Geometric proofs can be employed by setting up axioms about water and water pollution. Statements that can then be proven will be theorems. Mathematical theorems typically are expressed in the form "if a certain thing is true, then something else is true." In other words, most theorems are "if P, then A" statements. Deductive reasoning can thus be used to solve	
1. Research at the library		
2. Reporting		
3. Critical reading		
4. Evaluation		
5. Problem solving		

ESEA Title III - 59-70-0135-2 Project I-C-E

Discipline Area __Math_____

Subject   __Geometry_____

Problem Orientation __Water Sheds and__
                     __Water Conservation__ Grade __10__

SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity

A. List as many ways as possible of man's use of water shed control.
   1. Use library
   2. Report on different programs
   3. Evaluate the worth of existing programs
   4. Discuss pros and cons (Buzz groups)

B. Construct drawings using geometric designs of water shed management areas, showing use of land.

C. Geometric proofs can be employed by setting up axioms about water and water pollution. Statements that can then be proven will be theorems. Mathematical theorems typically are expressed in the form "if a certain thing is true, then something else is true." In other words, most theorems are "if P, then Δ" statements. Deductive reasoning can thus be used to solve (cont.)

II. Outside Resource and Community Activities

A. Take field trips to several water shed areas.

B. Check with nearest university officials to see what is being done in the area.

C. Invite resource people from water control units or from university

Resource and Reference Materials	Continued and Additional Suggested Lea
Publications:	I. (cont.)

520 Od <u>Fundamentals of Ecology</u>,
     I-C-E RMC
 VF <u>Environmental Management</u>,
    <u>Course Concept and Organization</u>
     I-C-E RMC
	problems. Use Ecolab Rural Studic
	 1. Measure a quadrat of land - or
	 2. Make a <u>Line Transect</u>.
	 3. Make a <u>Belt Transect</u>.
	 4. Make a <u>graph to show</u> number of
	     found in a quadrat of the fore
	 5. Walk along a <u>line transect</u> in
	     identify each tree that lies c

Audio-Visual: Film 200 <u>One Day at the Teton</u> <u>Marsh</u>, I-C-E RMC Film: <u>River Systems and Man</u> BAVI, 16 min. $2.00	
Community:	

Continued and Additional Suggested Learning Experiences

I. (cont.)

   problems. Use Ecolab Rural Studies.
   1. Measure a quadrat of land - one acre.
   2. Make a <u>Line Transect</u>.
   3. Make a <u>Belt Transect</u>.
   4. Make a graph to show number of each kind of tree
      found in a quadrat of the forest.
   5. Walk along a <u>line transect</u> in the forest and
      identify each tree that lies on it.

C	11. Individual acts, duplicated	Discipline Area	Math
O			
N	or compounded, produce significant	Subject	Geom
C			En
E	environmental alterations over time.	Problem Orientation	Ch
P			
T			

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EX	

Cognitive: The student will identify various geometric designes (circle, square, triangle and rectangle) and "environmental designs" (a house, a room, a city, etc) are very useful to man
 	
Affective: The student should recognize and appreciate that different shapes, textures, and colors are used to produce painting, drawings and sculpture.
 	
Skills to be Learned
1. Construction
2. Measurement
3. Identification
4. Comparison
	I. Student-Centered in class activity
	A. Each student will construct two squares with two inch sides, one circle with a two inch diameter, one circle with a three inch diamenter, an equilateral triangle with two inch sides and a rectangle with a dimension of two inches by four inches from different color construction paper.
	1. Use these geometric figures to form an interesting design and sketch this on a sheet of paper.
	2. Make another design and sketch this on another sheet of paper.
	B. Take each shape and label the squares as chairs, the small circle as a lamp, the large circle a table, the triangle as a television and the rectangle as a sofa.
	(cont.)
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ESEA Title III - 59-70-0135-2 Project I-C-E

Math	acts, duplicated	Discipline Area	Math
Geom	produce significant	Subject	Geometry
Env			Environmental
Cha	lterations over time.	Problem Orientation	Changes Grade 10

SUGGESTED LEARNING EXPERIENCES

G EX	CTIVES	
Outs	udent	I. Student-Centered in class activity
Commu	ous	
A. Ob	(circle,	A. Each student will construct
li	nd rec-	two squares with two inch
ar	onmental	sides, one circle with a
su	a room,	two inch diameter, one
th	ery use-	circle with a three inch
B. Ob		diamenter, an equilateral
C. Ta		triangle with two inch
sc	udent	sides and a rectangle with
er	nd	a dimension of two inches
in	fferent	by four inches from differ-
oi	and	ent color construction paper.
pa	pro-	1. Use these geometric
et	wings	figures to form an inter-
D. Or		esting design and sketch
di		this on a sheet of paper.
in		2. Make another design and
ar	ned	sketch this on another
al		sheet of paper.
E. Ha		B. Take each shape and label
in		the squares as chairs, the
gi		small circle as a lamp, the
ge		large circle a table, the
ti		triangle as a television
		and the rectangle as a sofa.
		(cont.)

II. Outside Resource and Community Activities

A. Obtain an art book from the library to observe geometric and "environmental" designs such as a plan of a cathedral, the design o: a city....
B. Obtain a book on architecture.
C. Take a field trip through the school to identify various environmental designs found in the building like the color of brick, stone or wood, the patterns of windows and doors, etc.
D. On the way home, observe different patterns of buildings, how they are grouped and how their design tells us about their use.
E. Have the industrial arts instructor come to class and give a talk on the use of geometric designs in construction.

Resource and Reference Materials	Continued and Additional Suggested Learn

Publications:
Curriculum Working Paper, Art Life
and the Environment, E. Corso,
University of Wisconsin, 1969
Architecture, Drafting and Design,
D. Hepler and P. Wallach, Mc-Graw-
Hill, 1965
 	
Audio-Visual:
Film #7880 - "Ark" ($9.00)-BAVI, 1971
Film #7922 - "Green Box" ($6.75)-
  BAVI, 1971
Film Junk Dump, I-C-E RMC
 	
Film #2996 - "Man's Impact on His
  Environment" ($7.50) - BAVI, 1969
 	
Community:
The city library
An architect
A building contractor
	I.B. cont.
	  1. Arrange these "items of furniture"
	    to you. Sketch on a piece of pape
	  2. Rearrange the items of furniture a
	    on another piece of paper.
	
	C. Compare the geometric design and "en
	  on the four sheets of paper. Think
	  the shapes where you did in each cas
	  real difference between the two kind

Learn... ...erials	Continued and Additional Suggested Learning Experiences

...ure'... ...rt Life
...pape... ...so,
...re a... ...69.
...Design,
...c-Graw-
 	
...I "en...
...ink...
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...kind...
 	
...BAVI, 1971
...5.75)-
 	
...on His
...VI, 1969
	I.B. cont.
	   1. Arrange these "items of furniture" which is acceptable
	      to you. Sketch on a piece of paper.
	   2. Rearrange the items of furniture and sketch this design
	      on another piece of paper.
	
	C. Compare the geometric design and "environmental" design
	   on the four sheets of paper. Think about why you placed
	   the shapes where you did in each case. The why is the
	   real difference between the two kinds of designs.

/12

C O N C E P T	Private ownership must be re- garded as a stewardship and should not encroach upon or violate the individual right of others.	Discipline Area Math Subject Geometry Pollutio Problem Orientation Angle Me

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EXPERI

ESEA Title III - 59-70-0135-2 Project I-C-E

Cognitive: The student will construct and measure angles and solve theorems and axioms.

Affective: The student investigates possible ways to show respect for private ownership.

Skills to be Learned
1. Measurement of angles
2. Basic properties of angles

I. Student-Centered in class activity
A. Define the terms:
   Angle
   Vertex
   Planes
   Half-planes
   Interior & exterior of an
     angle
   Rays
B. Draw constructions in note-books
C. Use protractor to measure angles
D. Discuss the difference between acute, right and obtuse angles. How are they different and how are they similar
E. Prove theorem: If one of the four angles formed by two intersecting lines is a right angle, then all of the four angles are right angles. Can be done on school grounds or any open area. Measure angles where two roads cross or two fences. Check this out on some neighboring property lines.
	II. Outside
	Communit
	A. Inter
	  their
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	  pollu
	  Strea
	  pollu
	  rake
	B. Take and m diffe
	C. Use a can m
	D. Map o to co pollu

Discipline Area __Math__

should   Subject   __Geometry__

                   Pollution

Problem Orientation __Angle Measurement__ Grade __10__

rs.

SUGGESTED LEARNING EXPERIENCES

tudent-Centered in class tivity	II. Outside Resource and Community Activities
Define the terms: Angle Vertex Planes Half-planes Interior & exterior of an angle Rays Draw constructions in note-books Use protractor to measure angles Discuss the difference between acute, right and obtuse angles. How are they different and how are they similar Prove theorem: If one of the four angles formed by two intersecting lines is a right angle, then all of the four angles are right angles. Can be done on school grounds or any open area. __Measure angles where two roads cross or two fences. Check this out on some neighboring property lines.__	A. Interview property owners on their views as to their rights on their land. (Ask) Can we pollute the land we live on? Streams? Take pictures of pollution in the community and make a bulletin board collage. B. Take a field trip to farm area and measure off areas using different angles. C. Use a sextant which students can make to measure angles D. Map out areas along roadways to compare for amount of pollution

C 1. Energy from the sun, the basic source   Discipline Area Mathema

O

N of all energy, is converted through plant   Subject   Advance

C

E photosynthesis into a form all living things   Problem Orientation Word

P   Fo

T can use for life processes.

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EXPERIENC	
Cognitive: To identify 5 important benefits received from the sun for our environment. Affective: To realize and appreciate the vital functions of the sun.	II. Student-Centered in class Activity A. Calculate the power produced by the sun thru thermonuclear reaction. (54,000 amps per reacton - 126,000,000,000,000)	II. $\tilde{l}$
Skills to be Learned: Formula Computation	B. Determine the percent of energy received by the sun side of the planet Earth. $1/2Bi$ (Surface area formulas) C. Evaluate the ways the sun's energy can be stored for later use. (i.e., fossil fuels) D. Demonstrate how 23^0 tilt diminishes the sun's effect on the enviro.:ment, causing seasons.	E (

ESEA Title III - 59-70-0135-2 Project I-C-E

RIENC	L OBJECTIVES	SUGGESTED LEARNING EXPERIENCES	
II.	To identify 5 benefits received fr. r our environment.	II. Student-Centered in class Activity	II. Outside Resource and Community Activities
	. To realize and ap- he vital functions of	A. Calculate the power pro- duced by the sun thru thermonuclear reaction. (54,000 amps per reacton - 126,000,000,000,000)	A. Visit the U.S. Weather Bureau. Have a meteor- ologist explain the sun's influence on weather patterns.
	be Learned: mputation	B. Determine the percent of energy received by the sun side of the planet Earth. 1/2Bi (Surface area formulas)	B. Visit the telephone company for an explana- tion of the operation and use of photo-electric cells.
		C. Evaluate the ways the sun's energy can be stored for later use. (i.e., fossil fuels)	C. Measure the amount of sunlight lost to the earth's surface by smog and air pollution.
		D. Demonstrate how 23° tilt diminishes the sun's effect on the environment, causing seasons.	

Resource and Reference Materials	Continued and Additional Suggeste
Publications:	
Audio-Visual:	
Community:	

yeste	eference Materials	Continued and Additional Suggested Learning Experiences

C 2. All living organisms interact

O

N   among themselves and their

C

E   environment, forming an intri-

P

T   cate unit called an ecosystem.

Discipline Area _Mathen

Subject Trig. (Fibonaco

Problem Orientation Math

In

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EX
Cognitive: Students should make a list of 5 things in nature which illustrate the Fibonacci Sequence, Fibonacci Fractions, or Geometric Shapes .	I. Student-Centered in class Activity II
Affective: Students will appreciate the beauty of mathematics in nature. They will be made aware of the simple plants and flowers in nature and, at the same time, appreciate their mathematical pattern.	A. Students study the units of sequence and series. B. As a special topic or math club project, they study some special sequences that are interesting because of their recreational value and relationship to nature. C. Study these series in relation to the field trip.

Skills to be Learned:

Fibonacci Sequence
Sequence of Fibonacci Frac-
    tions

ESEA Title III 59-70-0135-2 Project I-C-E

ather   anisms interact   Discipline Area __Mathematics__

onacc   es and their   Subject _Trig. (Fibonacci Sequence)_

Math   orming an intri-   Problem Orientation Mathematical Patterns Grade 11-
In   In Nature   12
         ed an ecosystem.

NG EX ES	SUGGESTED LEARNING EXPERIENCES	
II s should ings in rate the Fibon- Geometric	I. Student-Centered in class Activity	II. Outside Resource and Community Activities

I. Student-Centered in class Activity

A. Students study the units of sequence and series.

B. As a special topic or math club project, they study some special sequences that are interesting because of their recreational value and relationship to nature.

C. Study these series in relation to the field trip.

II. Outside Resource and Community Activities

A. A field trip in the woods or park will help students to enjoy nature and try to preserve it.

B. Some of the things they should be able to find Fibonacci patterns in are: daisies, the way leaves grow on many stems, scales on a fir cone, etc.

C. They could also look for other geometric shapes in nature. The seeds in a sunflower are arranged in a pattern formed by spirals winding from its center. The honeycomb built by bees contains hexagonal cells in which the bees store the honey.

D. A study of series will be done at the same time.

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ty of math-
They will
simple
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cal pat-

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Resource and Reference Materials	Continued and Additional Suggested Learning

Publications:
Mathematics Books
 	
The Giant Golden Book of
    Mathematics
 	
World of Mathematics, Volume 1,
    pp. 718-719
 	
Audio-Vidual:
 	
Community:	

ning | s | Continued and Additional Suggested Learning Experiences

C
U
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C
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P
T

3. Environmental factors are limiting

on the numbers of organisms living

within their influence, thus, each

environment has a carrying capacity.

Discipline Area ___Mathematic

Subject ___Consumer N

Problem Orientation ___Utiliti

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EXPERIENCES
Cognitive: Students will study the use of and demand for our natural resources versus the supply available. They will also compare this use and demand with earlier ages. Affective: Students should realize that as "Super-Consumers", we must judiciously use our natural resources.	I. Student-Centered in class Activity A. Study the devices man needs to operate at his present standard of living: 1. List the household items that use water power, natural gas or other natural resources. (i.e., dishwasher, washing machine, electric lights, etc.) 2. List the natural resources needed by man outside the house. (i.e., to run his auto, at work, etc.) 3. How does this list compare with 1930, 1890, 1850? 4. The comparisons above should be made by statistical analysis. B. Study Industrial demand on our natural resources.
Skills to be Learned: Public Knowledge of Power Production Statistical Analysis	

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Project I-C-E   ESEA Title III -59-70-0135-2

matic| ors are limiting   Discipline Area __Mathematics__

mer i| organisms living   Subject   __Consumer Math__

iliti| ence, thus, each   Problem Orientation __Utilities__   · Grade__11-12__

    carrying capacity.

NCES	;	SUGGESTED LEARNING EXPERIENCES	
. Ou Cc A. V C	l study for our is the will also emand with	**I. Student-Centered in class Activity**	**II. Outside Resource and Community Activities**

1.
pc
	hould
	-Consumers"
	@ our
		A. Study the devices man needs to operate at his present standard of living:
		
		1. List the house: old items that use water power, natural gas or other natural resources. (i.e., dishwasher, washing machine, electric lights, etc.)
			A. Visit an electric utility Company.
			
			1. Have methods of producing power explained:
			  a. Hydroelectric
			  b. Fossil Fuel
			  c. Nuclear Power

B. I pr pc		2. List the natural resources needed by man outside the house. (i.e., to run his auto, at work, etc.)	B. Learn of distribution problems for the three power producers above.
C. S lu ea	wer	3. How does this list compare with 1930, 1890, 1850?	C. Study the individual pollution problem created by each method.
D. W			D. Where is each used?
E. W fu		4. The comparisons above should be made by statistical analysis.	E. Which method is fit for the future?
1. po			1. What source of public power can we continue to use?
cc		B. Study Industrial demand on our natural resources.	(continued on reverse side)

Resource and Reference Materials	Continued and Additional Suggested [cut off]

Publications:
 	
Mishan, E. J., Technology and Growth - The Price We Pay, Praeger, 1969
 	
Bernstein, Peter, The Price of Prosperity, Random, 1966
 	
Mumford, Lewis, The Myth of the Machine, Harcourt Brace Jevanovich, 1970
 	
Abrahamson, Dean, Environmental Costs of Electric Power, Scientists Institute for Public Research, 30 E. 68th Street, N.Y., N.Y., 1970.
 	
Audio-Visual:
 	
#1756 - Principles of Electricity, color, $3.50, 22 minutes, GE, 1945, no advertising, B.A.V.I.
 	
#0156 - Atomic Energy, 10 minutes, $2, EBF, 1947, B.A.V.I.
 	
#6378 - Atomic Power Production, 13 minutes, $5, color, Handel, 1964, B.A.V.I.
 	
Community:
 	
Power Plant -- Engineer
 	
(continued on right hand side)
	II. (continued)
	   E.
	      2. What sources of power remain, [cut off]
	         gas and radioactive materials
	
	Community: (continued)
	
	National Environmental Organization, [cut off]
	   Resources for the future, Inc.
	   1755 Massachusetts, Ave., N.W.
	   Washington, D.C. 20036
	
	Citizen Natural Resources Associatio[cut off]
	   c/o Carla Kruse, Hickory Hill Farm [cut off]
	   Loganville, Wisconsin 53943

ted [	ials	Continued and Additional Suggested Learning Experiences

II. (continued)
  E.
    2. What sources of power remain, with coal, natural
       gas and radioactive materials in limited supply?

Community: (continued)

National Environmental Organization, write to:
  Resources for the future, Inc.
  1755 Massachusetts, Ave., N.W.
  Washington, D.C. 20036

Citizen Natural Resources Association
  c/o Carla Kruse,Hickory Hill Farm
  Loganville, Wisconsin 53943

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C	3. Environmental factors are limiting	Discipline Area ___ Mathe:
O		
N	on the numbers of organisms living-	Subject ___ Advan
C		
E	with in their influence, thus, each	Problem Orientation Ari
P		
T	environment has a carrying capacity.	

	BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EXPERIEN
	Cognitive: The student will list the demands made on our earth by a single person during his life-time.	I. Student-Centered in class Activity	II.
		A. Estimate and total the amount of natural resources needed by a single indivi-dual throughout his life-time. (i.e. Human Drain)	
	Affective: The student will sug-gest ways to reduce the tendency to waste certain natural resour-ces.	Specific research for better students. Some Lifetime Statistics Samples follow for instructors use:	B
			C
	Skills to be Learned:	3,000,000 gal. Water 20,000 gal. Gasoline 46 tons Garbage (6 ½b/day)	
	Summation of an arithmetic progression		
	Decimal Multiplication Gathering Data	B. Expand this total to the population of your family, community, state or nation.	
		C. Problems:	
		1. Examine projected re-maining supply of coal (400 years), natural gas (13 years), oil	

ESEA Title III - 59-70-0135-2 Project I-C-E

:tors are limiting ____   Discipline Area __Mathematics_____

:ganisms living ____   Subject _____Advanced Algebra_____

:ce, thus, each ____   . Problem Orientation Arithmetic _____ Grade 11-12
                                             Progression

arrying capacity. ____

S	SUGGESTED LEARNING EXPERIENCES	

will list
eatth by
his life-
 	
will sug-
tendency
l resour-
 	
tic
	I. Student-Centered in class
	    Activity
	
	A. Estimate and total the
	   amount of natural resources
	   needed by a single indivi-
	   dual throughout his life-
	   time. (i.e. Human Drain)
	   Specific research for better
	   students. Some Lifetime
	   Statistics Samples follow
	   for instructors use:
	
	   3,000,000 gal. Water
	      20,000 gal. Gasoline
	   46 tons Garbage
	      (6 lb/day)
	
	B. Expand this total to the
	   population of your family,
	   community, state or nation.
	
	C. Problems:
	
	   1. Examine projected re-
	      maining supply of coal
	      (400 years), natural
	      gas (13 years), oil
	   (continued on reverse side)
		II. Outside Resource and
		     Community Activities
		
		A. Visit a grocery store to
		   find out how much food is
		   sold each week.(per capita)
		
		B. Compare the sales of re-
		   turnable bottles with
		   non-returnable containers
		   now with those in 1969.
		
		C. Visit community incinerator
		   or sanitary landfill to
		   quantify the refuse dis-
		   carded each week.

Resource and Reference Materials	Continued and Additional Suggested Le
Publications: Mishan, E.J., <u>Technology and Growth - The Price We Pay</u>, Praeger, 1969 Toynbee, Arnold, <u>Change and Habit</u>, Oxford University Press 1966 Marine, Gene, <u>America the Raped</u>, Simon and Schuster, 1969 **Audio-Visual:** #7614 - <u>Minerals Challenge</u>, color, $2, 1970, 30 minutes B.A.V.I. #7624 - <u>Problems of Conservatio</u>: <u>Minerals</u>, color, $6.75, 1969, 16 minutes, B.A.V.I. #0468 - <u>Conservation Road: Story of Our Natural Resources</u>, $3.50, 1947, 20 minutes **Community:** DNR office Grocery Store Sanitary System Landfill Area	I. (continued) 1. (30 years), Uranium (3 (___) as energy sourc 2. Examine supply of mine production: Steel (35 years), Tin (30 years) and Zinc (20 years) 3. Americans are "Super C 50 times as much natur veloped nations (i.e., 6% of the world popula energy.

inued and Additional Suggested Learning Experiences

I. (continued)

1. (30 years), Uranium (35 years), electricity
   (___) as energy sources.

2. Examine supply of minerals for industrial
   production: Steel (350 years), Copper (35
   years), Tin (30 years), Lead (25 years),
   and Zinc (20 years)

3. Americans are "Super Consumers". They use
   50 times as much natural resources as unde-
   veloped nations (i.e., India). Therefore,
   6% of the world population uses 30% of its
   energy.

C	4. An adequate supply of pure	Discipline Area ___Mathem
O N	water is essential for life.	Subject ___Consum
C E		Problem Orientation ___W
P T		

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EXPERIEN
Cognitive: Students will tabulate the amount of water used per person/per day.	I. Student-Centered in class Activity -
Affective: The students will appreciate the value of water as a natural resource.	A. Each student will determine the amount of water used by his family by reading the water meter each morning in his home.
	1. Each student will keep a daily record of water used by his family. 2. Compare this with the established norm of 60 gallons per person/per day.
Skills to be Learned:	
Data Collecting Data Analysis Problem Solving Water Meter Reading	B. Sample Problem: An imaginary stream is 400 feet wide and 15 feet deep. It has an average velocity of 2 miles per hour. If there are 7.48 gallons of water per cubic foot;
	1. How many gallons of water in its flow each hour? 2. How many gallons each day? 3. How long would it take to consume all the river's water--given our town's Pop. and daily consumption rate.

II.

A.

(co

ESEA Title III-59-70-0135-2 Project I-C-E

Discipline Area __Mathematics__

Subject __Consumer Math__

Problem Orientation __Water Supply__ Grade __11-12__

SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class Activity

A. Each student will determine the amount of water used by his family by reading the water meter each morning in his home.

1. Each student will keep a daily record of water used by his family.
2. Compare this with the established norm of 60 gallons per person/per day.

B. Sample Problem: An imaginary stream is 400 feet wide and 15 feet deep. It has an average velocity of 2 miles per hour. If there are 7.48 gallons of water per cubic foot;

1. How many gallons of water in its flow each hour?
2. How many gallons each day?
3. How long would it take to consume all the river's water--given our town's Pop. and daily consumption rate.

II. Outside Resource and Community Activities

A. Civic

1. Read water meter in home daily.
2. Visit a water treatment plant.
3. Find out which cities and towns contribute pollution to local waters.
4. Check to see if each city provides adequate waste treatment.
5. Do existing facilities measure up to present pollution loads?
6. From data gathered, figure out cost of cleaning polluted water.
7. Does local plant operate 24 hours a day? 365 days a year?
8. If plant claims 90% Efficiency, how many times a year is that percentage reached?

Resource and Reference Materials	Continued and Additional Suggested L

Publications:

National Council for Air and
Stream Improvement, 103 Park
Ave., N.Y., N.Y. 10026

American Public Health Association
1704 Broadway, N.Y., N.Y. 10019

American Institute of Plant Engin-
eers Industrial Pollution Com-
mittee, 1056 Delta Ave., Cincin-
nati, Ohio, 45208

Water Pollution Control Federation
3900 Wisconsin Ave.,N.W., Wash-
ington, D.C. 20016

Department of Interior -- Water
Pollution, Washington, D.C. 20240

Water in Industry - A Survey of
Water Use in Industry, National
Association of Manufacturers and
Chamber or Commerce of U.S.,
$2, January 1965

Clean Water - It's up to You,
free booklet, Izaak Walton League
of America, 1326 Waukegan Road,
Glenview, Illinois 60025

Audio-Visual:

What Are We Doing To Our World?
Part I (25 minutes) and Part II
(27 minutes), $16 each for rental
(continued on right side)

II. (continued)
  B. Industry

    1. If treatment is inadequate, wh
       taking to increase its facili
    2. What will be the cost to impro
       will be paying the added cost?

  C. Write to the*Federal Water Pollu
     for guidelines of pollution cont

  D. Check your local industries and
     if they compare favorably.

  E. Begin family campaigns to minimi

    1. Check ball float on lavatory,
    2. Dripping faucet should be che
    3. Keep cold drinking water in r
    4. Avoid running tap water unnec
    5. Use saver on washing machine.
    6. Have students find other ways

  F. Evaluate the inconvenience of wat
  G. Compare consumption of water in U
     other countries.
  H. Find out where the water from dow
     go. If they are hooked up to the
     dinary rainy day will increase th
     from your house by 300% or more.

*3900 Wisconsin Ave., Washington, D.C.

Community:

Kimberly Clark: Publications and Pamp
  office. The New River; 16mm. sound o
  Public Relations Dept., Neenah

II. (continued)

B. Industry

1. If treatment is inadequate, what steps is industry taking to increase its facilities?
2. What will be the cost to improve facilities? Who will be paying the added cost?

C. Write to the*Federal Water Pollution Control Administration for guidelines of pollution control.

D. Check your local industries and city water supply to see if they compare favorably.

E. Begin family campaigns to minimize water consumption:

1. Check ball float on lavatory,
2. Dripping faucet should be checked and fixed if faulty.
3. Keep cold drinking water in refrigerator.
4. Avoid running tap water unnecessarily.
5. Use saver on washing machine.
6. Have students find other ways to save water.

F. Evaluate the inconvenience of water saving.
G. Compare consumption of water in U.S. with consumption in other countries.
I.. Find out where the water from down spouts and drain tiles go. If they are hooked up to the municipal sewer, an ordinary rainy day will increase the flow in the sewer line from your house by 300% or more.

*3900 Wisconsin Ave., Washington, D.C.

Community:

Kimberly Clark: Publications and Pamphlets available at Main office. The New River; 16mm. sound color film available from Public Relations Dept., Neenah

C 4. An adequate supply of pure	Discipline Area	Math
O		
N water is essential for life	Subject	Advanced
C		Dis
E	Problem Orientation	
P		
T		

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EXPE	

Cognitive: Students will list the difficu-ties of the public water system.
 	
Affective: Students will put water on the top pedestal as our greatest natural resource.
 	
Skills to be Learned
1. Data analysis
2. Channelization of H_2O.
3. Evaluation of economic compro-mization (cost of improving facilities as compared to bene-fits derived)
	I. Student-Centered in class activity
	A. Examine the water needs of man (STIX: 150 gal./ person pumped-actual fact)
	  1. 60 gal. personal use
	  2. 20 gal. commercial use
	  3. 10 gal. distribution losses
	  4. 50 gal. industrial uses
	  5. 10 gal. livestock
	How much water does your class use each day? the families of the class?
	B. Calculate the cost of obtaining, treating, distributing, disposing, retreating and repurify-ing this water.
	C. Extrapolate the impact by comparing it to the entire population of a community
	D. Students should:
	  1. Study distillation
	  2. Study electrolysis
	  3. Understand how water is unique in its re-cycling process.
	      (cont.)
		II. Outsi Commun
		A. Vis
		  1.
		
		  2.
		
		  3.
		
		B. Vis
		  see
		  for

ly of pure

Discipline Area __Math__

anced or life

Dis

Subject __Advanced Algebra__

Distributive
Problem Orientation __Law__ Grade __11-12__

EXPE	SUGGESTED LEARNING EXPERIENCES	
Outsi	I. Student-Centered in class	II. Outside Resource and
mmun	activity	Community Activities
Vis	A. Examine the water needs	A. Visit a water department
1.	of man (STIX: 150 gal./	1. Explain the problems of
	person pumped-actual	obtaining high quality water
2.	fact)	2. Explain mineral content
	1. 60 gal. personal use	problems
3.	2. 20 gal. commercial use	3. Examine destruction problems
	3. 10 gal. distribution	a. Hardness
	losses	b. Frost
	4. 50 gal. industrial uses	c. Expansion contraction
	5. 10 gal. livestock	d. Pumping and pressure
Vis	How much water does your	B. Visit the street department to
see	class use each day? the	see the maintenance required
for	families of the class?	for the distribution system.

I. Student-Centered in class
activity
A. Examine the water needs
of man (STIX: 150 gal./
person pumped-actual
fact)
1. 60 gal. personal use
2. 20 gal. commercial use
3. 10 gal. distribution
losses
4. 50 gal. industrial uses
5. 10 gal. livestock
How much water does your
class use each day? the
families of the class?
B. Calculate the cost of
obtaining, treating,
distributing, disposing,
retreating and repurify-
ing this water.
C. Extrapolate the impact
by comparing it to the
entire population of a
community
D. Students should:
1. Study distillation
2. Study electrolysis
3. Understand how water
is unique in its re-
cycling process.
(cont.)

Resource and Reference Materials	Continued and Additional Suggested Le
Publications:	I. (cont.)
140 Soil Conservation Society of SO America, 1969, Water Use: Principles and Guidelines for Planning and Management in Wisconsin, I-C-E RMC	4. Discover what pollutants are eas to remove. 5. Compare methods of water purific sedimentation.
VF U.S. Dept. of the Interior, 1969, A Primer on Waste Water Treat- ment, Federal Water Pollution Control Administration, I-C-E RMC	
VF U.S. Dept. of the Interior, 1970, Clean Water-It's Up To You, Federal Water Quality Admin. I-C-E	
VF What You Can Do About Water Pollution, Cffice of Public In- formation, Federal Water Quality Admin., I-C-E RMC	
Audio-Visual: #6141-"Every Drop Fit to Drink," color, $2.00, 15 min., 1965, BAVI #6923-"3rd Pollution," color, 22 min., $7.50, 1966, BAVI #2903-"The Waters Around Us," 22 min., $2.00, I-C-E RMC #280-"The Gifts," color, I-C-E, RMC Simulation Game: SG3 - 1970, Dirty Water: The Water Pollution Game, I-C-E RMC	
Community: Industrial water chemists Science teacher	

ed Le ls	Continued and Additional Suggested Learning Experiences
eas ::	I. (cont.)
rific or	4. Discover what pollutants are easy and which are difficult to remove.
	5. Compare methods of water purification filterization vs. sedimentation.
1969, at- on E	
1970,	
I-C-E	
In- lity	
I	
min.,	
RMC ty	

C O N C E P T
5. An adequate supply of clean air is essential because most organisms depend on oxygen, through respiration, to release the energy in their food.

Discipline Area ___Math___

Subject ___Problem Sol__

Problem Orientation ___Air Poll__

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EXPER__	

Cognitive: The student will list the sources of air pollution and the cost of control of these pollutants in their community.
 	
Affective: The student will weigh the cost of pollution control against environmental costs resulting from pollution damage.
 	
Skills to be Learned
Problem Solving
Cost analysis
Data gathering
	I. Student-Centered in class activity
	  A. Students will list the major air pollutants and the hazards of various pollutants. (Research)
	    1. City
	    2. National
	  B. Check into the various control measures and the cost of these measures.
	    1. Compare these costs to the problems in their city, state, nation.
	  C. In relation to human health, personal property, vegetation and other materials, what is the cost to maintain, repair or replace, due to air pollutants?
	  D. Sample problem:
	    1. Aggravated by air pollutants, emphysema is the fastest growing cause of death in our country today. In the ten-year period, 1950-1959, deaths among males
	                                    (cont.)
		II. Ou__
		  Com__
		  A.
		
		  B.
		
		  C.

ESEA Title III - 59-70-0135-2 Project I-C-E

line Area ___Math___

Sol___ ___:t___ ___Problem Solving___

Pollu ___em Orientation ___Air Pollution___ ___Grade11-12___

XPERI SUGGESTED LEARNING EXPERIENCES

. Ou ed in class
Com
A. 1 list the
llutants and
of various
(Research)

the various
ures and the
ie measures.
these costs
oblems in
ty, state,

B. to human
sonal property,
and other
what is the
ntain, repair
due to air

lem:
ed by air
ts, emphysema
C. astest growing
death in our
today. In the
period, 1950-
eaths among males
(cont.)

II. Outside Resource and
Community Activities
A. Visit local indus-
tries to check what
measures they are
taking relative to
air pollution
control.
1. What is the cost
of the control
measures?
2. Determine the
problems in
control level
of air pollution.
B. Interview medical
personnel.
1. What pollutants
are most injurious
to our health?
2. What are the
amounts of
pollutants and the
cost involved
(medically)?
C. Check with city
authorities about
their air pollution
regulations.

Resource and Reference Materials	Continued and Additional Sugge

Publications:
Appleton Post Crescent, Sunday
  Feb. 27, 1972, Section F, p. 1.
In Quest of Cleaner Air & Water,
  I-C-E RMC
 	
Audio-Visual:
The Poisoned Air, 50 min., color,
  National Medical AV Center
  Chamblee, Ga. 30005
Air Pollution - A Series
  WOR-TV
  1440 Broadway
  New York, N.Y. 10018
Simulation Game:
Smog: The Air Pollution Game
  I-C-E RMC
 	
Community:
  Library
  City Hall
    Health Dept.
    Transportation Dept.
    Industrial Management Comm.
  Local industries
	I. (cont.)
	    from emphysema rose from
	    to 8 per hundred thousan
	    steadily increased, in 1
	    U.S. was 203 million and
	    emphysema, how many peop
	    died from emphysema? Wha
	    made for 1980?
	  E. Have the students take t
	    gathered in the class an
	    make up some problems.
	    1. Give the problems to
	      class to work on.

Continued and Additional Suggested Learning Experiences

I. (cont.)

from emphysema rose from 1.5 per hundred thousand
to 8 per hundred thousand. If this total has
steadily increased, in 1970 the population of the
U.S. was 203 million and 50,000 persons died from
emphysema, how many people per hundred thousand
died from emphysema? What predictions could be
made for 1980?

E. Have the students take the information they have
gathered in the class and outside activities and
make up some problems.
1. Give the problems to other members of the
class to work on.

C **5. An adequate supply of clean air is**
O
N **essential because most organisms**
C
E **depend on oxygen, through respiration,**
P
T **to release the energy in their food.**

Discipline Area __Math__

Subject __Consumer Math__

Problem Orientation __Resources__

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EXPERIEN

Cognitive: Student will collect, present and interpret data regarding causal relationship between smoking and the death rate.
 	
Affective: Students will form opinions regarding the evidence involved with cigarette smoking.
 	
Skills to be Learned
1. Researching material
2. Graphing statistical facts
3. Using sampling techniques
4. Computing correlation
5. Determining mean, median, mode and standard deviation.
	I. Student-Centered in class activity
	  A. Read assigned material (see back publications)
	  B. Graph the relationship between time in years and the number of smokers in the U.S. by a line graph.
	  C. Graph, by use of a histogram, the percentage of smokers in the U.S. in relationship to every 10 years starting with the year 1900.
	  D. The student shall determine the correlation between number of packs of cigarettes vs. the death rate.
	  E. The student will, from their sample in II, find the mean, median, mode and standard deviation of the number of cigarettes per day of the smokers.
	  F. Compute the cost for a person who smokes two packs of cigarettes a day at 50¢ a pack over a ten year period.

II. Outside Res
  Community A
  A. Develop
    determine
    cigarette
    day.
    1. Deter
      sampl

Discipline Area **Math**

Subject **Consumer Math**

Problem Orientation **Resources**   Grade **11-12**

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Mati   ms

urces   iration,

food.

SUGGESTED LEARNING EXPERIENCES

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ad assigned material
ee back publications)
aph the relationship
tween time in years and
e number of smokers in
e U.S. by a line graph.
aph, by use of a histo-
am, the percentage of
okers in the U.S. in
lationship to every 10
ears starting with the
ar 1900.
he student shall determine
he correlation between
umber of packs of cigarettes
s. the death rate.
he student will, from
heir sample in II, find
ne mean, median, mode and
tandard deviation of the
umber of cigarettes per
ay of the smokers.
ompute the cost for a person
ho smokes two packs of
igarettes a day at 50¢ a
ack over a ten year period.

II. Outside Resource and
Community Activities
A. Develop a questionnaire that
determines the number of
cigarettes a person smokes a
day.
1. Determine by using a random
sample of 50 people.

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Resource and Reference Materials	Continued and Additional Su
Publications: Smoking and Death Rates-A Riddle in Cause and Effect, by E. Cuyler Hammond Effect of Smoking, by E. Cuyler Hammond-W.H. Freeman and Co. Lung Cancer Death Rates in Relation to Smoking-American Cancer Society Chart Book in Smoking, Tobacco, Health, U.S. Lept. of Health, Education and Welfare The Health Consequence of Smoking, U.S. Dept. of Health, Education and Welfare **Audio-Visual:** #3485-"Let's Discuss Smoking- No Smoking," $3.25, 16 min., BAVI #5904-"No Smoking," Sid Davis, 10 min., $2.25, 1964, BAVI #6033-"Smoking and You," Color, $4.50, Contemporary, 1964, 11 min., BAVI #7538-"Smoking: It's Your Choice," color, 15 min., $6.00, 1970, Alfred Higgins, BAVI **Community:** City health official, doctor visits class	

al Su inued and Additional Suggested Learning Experiences

C
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7. Factors such as facilitating transportation

econcmic conditions, population growth, and

incrcased leisure time have a great influence

on clanges in land use and centers of

population density.

Discipline Area

Subject

Problem Orienta

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING E	
Cognitive: The student will compile data and determine a proportionality constant for population growth.	I. Student-Centered in class activity	II.
	A. Compile population data for	
	1. Several countries	
	2. Several states	
Affective: The student will develop an awareness of factors affecting population growth.	3. Several cities from 1900 through 1970	
	B. Graph data	
	C. Find places of declining population and determine factors contributing to decline.	
Skills to be Learned	D. Compare birth rates and death rates for U.S. for several years.	
1. Data analysis	E. Predict population for 1980 and 2000 using data from part A.	
2. Exponential law		
3. Geometric sequence		
4. Prediction formulas	1. Use Malthas formula $x_{n+1} = q \cdot x_n$ where $x_1 =$ population of first generation $q =$ constant of proportionality or the ratio of the geometric sequence	
	2. Use Verhalst's formula $x_{n\pm1} = \dfrac{q}{1+rx_n} \cdot x_n$ where x is a competition f (cont.)	

Area |litating transportation   Discipline Area   Mathematics

     |ulation growth, and   Subject   ·Algebra II

enta |have a great influence   Problem Orientation popula-   Grade 11
                                                    tion growth

     |and centers of

		SUGGESTED LEARNING EXPERIENCES	

II. | 11 | I. Student-Centered in class activity | II. Outside Resource and Community Activities

A. Compile population data for
1. Several countries
2. Several states
3. Several cities from 1900 through 1970
B. Graph data
C. Find places of declining population and determine factors contributing to decline.
D. Compare birth rates and death rates for U.S. for several years.
E. Predict population for 1980 and 2000 using data from part A.
1. Use Malthas formula $x_{n\pm1} = q \cdot x_n$ where $x_1 \equiv$ population of first generation
$q =$ constant of proportionality or the ratio of the geometric sequence
2. Use Verhalst's formula $x_{n\pm1} = \dfrac{q}{1+ rx_n} \cdot x_n$
where r is a competition factor
(cont.)

A. Visit a computer center where population size or structure can be simulated by varying ecological factors.

Resource and Reference Materials	Continued and Additiona
Publications: Studies in Mathematics Volume X Applied Iathematics in High School by Max M. Schiffer SMSG Population Bulletin World Population Data Sheet People Population Reference Bureau 1755 Massachusetts Avenue N.W. Washington, D.C. 20036 ($3.00 per year) U.S. News and World Report March 6, 1972, P. 34 1971 E.Q. Index I-C-E RMC Plato System of Computer Parameters Paul Handler University of Illinois' Urbana, Ill. 61801 1917 EQ Index National Wildlife Federation I-C-E RMC Audio-Visual: Community: Computer control center	I. (cont.) 　3. Use a method of y 　　develop a method 　　the future. Comp 　　Malthas and Verha

tiona	ce Materials	Continued and Additional Suggested Learning Experiences

		I. (cont.)
		  3. Use a method of your own. The student will
		     develop a method to determine population in
		     the future. Compare your method to the
		     Malthas and Verhalst formulas.

of y	olume X igh r	
chod		
Comp		
Verha		
	eet	
	eau e N.W.	
	rt	
	Parameters	
	tion	

C	8. Cultural, economic, social, and	Discipline Area	Math
O			Problem Solv
N	political factors determine status	Subject	Scientific N
C			
E	of man's values and attitudes toward	Problem Orientation	Sound Pol
P			
T	his environment.		

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EXPERIEN
Cognitive: Students will make a list of things in their community which contribute to sound pollution, both industrial and recreational.

Affective: Students volunteer to measure the intensity of a variety of noises in the community: a factory, traffic, a dance with a live group furnishing music, snowmobile, etc.

Skills to be Learned
The formula for measuring intensity of sound.
$I = \dfrac{P}{A}$ I=Watts per sq. cm.
P=Sound power in Watts
A=Area in sq. cms.
Surface area of sphere = $4 \pi r^2$

Work with scientific numbers
Problems in logarithms
Understand decibel as a unit of measure | I. Student-Centered in class activity
A. Measure areas and intensity of noise. (A decimeter can be borrowed if not available.)
B. Students should learn the definitions of some unfamiliar terms:
1. Intensity of sound
2. Threshold of hearing 10^{-16} watts/cm^2
3. Threshold of pain
4. Degree of loudness
5. Decibel
C. Sample Problem: Taken from Modern Physics, Williams, Metcalfe, Lefler.
1. Sound energy is radiated uniformly in all directions from a small source at a rate of 1.2 Watts.
a. What is the intensity of sound at a point (2500 cm) 25 meters from the source?
b. What is the intensity level.
(cont.) |

Left margin (vertical text): ESEA Title III - 59-70-0135-2 Project I-C-3

Right column headers (partially cut off):
II. Ou
Com
A.
B.
C.
D.

Discipline Area __Math_____

Subject _____ Problem Solving - Logarithms
                   Scientific Numbers, Graphing

Problem Orientation__Sound Pollution____Grade__9,11,12

SUGGESTED LEARNING EXPERIENCES	
I. Student-Centered in class activity	II. Outside Resource and Community Activities
A. Measure areas and intensity of noise. (A decimeter can be borrowed if not available.)	A. Check with factories and find out what problems they have with excessive noise. Ask what they have been able to do to control it.
B. Students should learn the definitions of some unfamiliar terms: 1. Intensity of sound 2. Threshold of hearing 10^{-16} watts/cm^2 3. [t]eshold of pain 4. Degree of loudness 5. Decibel	B. Ask someone from the factory, foundry, etc., to explain the type of injury (permanent or temporary) which a person can sustain from excessive noise.
C. Sample Problem: Taken from Modern Physics, Williams, Metcalfe, Lefler. 1. Sound energy is radiated uniformly in all directions from a small source at a rate of 1.2 Watts. a. What is the intensity of sound at a point (2500 cm) 25 meters from the source? b. What is the intensity level. (cont.)	C. Check with someone from Workman's Compensation Ins., a doctor, etc., on the extent & seriousness of the problems of sound pollution. D. Formulate a question-naire and have the students use it with their neighbors to find out what kind of noises bother them most in the neighborhood.

Resource and Reference Materials	Continued and Additional Suggested Le
Publications:	**I.** (cont.).

Publications:

U.S. News & World Report, Sept. 23, 1963, p. 64.

Science World, Feb. 9, 1970, p. 8.

Milwaukee Journal, June 29, 1971.

Health, Winter 1970, p. 20.

Our Sunday Visitor, Mar. 21, 1971, Decibel Dynamite.

Changing Times, March 1971, p. 33.

Sunday Post Crescent (Appleton, Wi.) Nov. 8, 1970, page E-3.

Newsweek, Feb. 7, 1972.

Science Digest, June 1968, pp. 67-8.

Time, Aug. 9, 1968, p. 47.

Science Digest, Oct. 1968, pp. 63-4.

Audio-Visual:

Visual Education Consultants, Inc. Noise Pollution, filmstrip #3013

From NET, Indiana University AV Center, Bloomington, Ind. 47401

Noise: The New Pollutant (30 min. film), rental $6.75.

Community:

I. (cont.).

2. Solutions:

a. $I = \dfrac{P}{A} = \dfrac{1.2W}{4\pi(2500)^2} = \dfrac{1.2}{7.85x}$

b. $10 \log \dfrac{I}{I} = 10 \log \dfrac{15x10^{-}}{10^{-1}}$

D. Teacher-student discussion.

1. Encourage students to have he

2. Encourage students to keep th of noise pollution.

3. Press for laws which control

4. Continue to be conscious of t pollution on "quality of life students to avoid needlessly pollution in the community.

5. Keep students aware of injury permanent) to their ears. Los due to excessive noise is rea

6. Find a table of intensity lev sounds. Compare these sounds.

Continued and Additional Suggested Learning Experiences

I. (cont.)

2. Solutions:

a. $I=\frac{P}{A} = \frac{1.2W}{4\pi(2500)^2} = \frac{1.2}{7.85\times10^8} = 1.5\times10^{-8}$ w/cm^2

b. $10 \log \frac{I}{I_0} = 10 \log \frac{15\times10^{-8}}{10^{-16}} = 10 \log(1.5\times10^8)$

$= 82$ decibels

D. Teacher-student discussion.
1. Encourage students to have hearing examinations.
2. Encourage students to keep the community aware of noise pollution.
3. Press for laws which control noise pollution.
4. Continue to be conscious of the effect of noise pollution on "quality of life" and encourage students to avoid needlessly adding to noise pollution in the community.
5. Keep students aware of injury (probably permanent) to their ears. Loss of hearing due to excessive noise is real.
6. Find a table of intensity levels of various sounds. Compare these sounds.

C	9. Man has the ability to manage,
O	
N	manipulate, and change his
C	
E	environment.
P	
T	

Discipline Area Math

Subject Advan

Problem Orientation Bal

	BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING
ESEA Title III - 59-70-0135-2 Project I-C-E	**Cognitive:** The student will set up an equation showing the benefits and disadvantages of each given topic and balance the facts & create a positive action. **Affective:** The student will evaluate projects comparing short term advantages to long term disadvantages. Skills to be Learned 1. Balancing 2. Creating off setting forces with little or no complications.	I. Student-Centered in class activity A. Research and list alternating environmental change. (Examine good and bad effects) 1. Build dams & reservoirs 2. Kill mosquitos & insects 3. Dredge channels 4. Project Sanquine 5. Melt Polar caps 6. Super Sonic aircraft 7. Space probes 8. Subterranean mining 9. Strip mining 10. Convert salt H_2O 11. Rain making 12. Landfill reclamation.

Discipline Area __Math__

Subject __Advanced Algebra__

Problem Orientation __Balancing Equations__ Grade __11__

SUGGESTED LEARNING EXPERIENCES

Student-Centered in class activity

A. Research and list alternating environmental change. (Examine good and bad effects)
1. Build dams & reservoirs
2. Kill mosquitos & insects
3. Dredge channels
4. Project Sanquine
5. Melt Polar caps
6. Super Sonic aircraft
7. Space probes
8. Subterranean mining
9. Strip mining
10. Convert salt H_2O
11. Rain making
12. Landfill reclamation.

II. Outside Resource and Community Activities

A. Visit a museum to see an ant farm or a honey farm at work.
B. Class speaker - have a "conservationist" explain the unexpected complications and disadvantages of I. (1,2,4,9,etc.)
C. Look at the effect of the "Vietnam Conflict" on the vegetation and soil.

RESOURCE AND REFERENCE MATERIALS	Continued and Additional Suggeste
Publications:	

160WA Man and His Environment
        I-C-E RMC
100BU Daydreams and Nightmares
        I-C-E RMC
Newspapers	

Audio-Visual:
 	
BAVI
2996 - Man's Impact on His
        Environment - Color
        $7.50 - 22 minutes -
        1969.
1595 - Our Earth - $2.00 -
        11 minutes - 1937	

Community: County Conservation Officer Another classroom (science) or museum Library 7	

geste	ERIALS	Continued and Additional Suggested Learning Experiences
	nent	
	ares	

C O N C E P T	11. Individual acts, duplicated or compounded, produce significant environmental alterations over time.	Discipline Area ___Math___ Subject ___Consumer M___ Problem Orientation Mass Tran

	BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EXPERI
ESEA Title III - 59-70-0135-2 Project I-C-3	Cognitive: The student will compare the advantages and disadvantages of mass transportation of all types and determine which method will save natural resources, yet, be convenient. Affective: The student will realize that we must sacrifice some conveniences to save our own environment. Skills to be Learned Data collecting Comparisons (rational)	I. Student-Centered in class activity A. Research and discuss the extra cost in loss of natural resources of individual transportation as opposed to mass transportation. B. Facts given: 1. Cars amount for 67% of traffic but carry only 15% of the passengers. 2. One passenger train can carry traffic equal to 20 traffic express lanes. Teacher uses these facts to illustrate problem-solving methods in assessing the advantages and disadvantages of transportation. Teacher assigns small groups of students to calculate the costs and impact (advantages and disadvantages) of varied methods of transportation: automobile, buses, rail, monorail, elevated train, helicopter, light plane, (cont.)	II. Ou Com A. B.

Discipline Area __Math__

Subject __Consumer Math__

Problem Orientation Mass TransportationGrade 10-12

APERI

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Comp
A.

B.

SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class
   activity
   A. Research and discuss the
      extra cost in loss of
      natural resources of
      individual transportation
      as opposed to mass
      transportation.
   B. Facts given:
      1. Cars amount for 67% of
         traffic but carry
         only 15% of the
         passengers.
      2. One passenger train can
         carry traffic equal to
         20 traffic express lanes.
      Teacher uses these facts to
      illustrate problem-solving
      methods in assessing the
      advantages and disadvan-
      tages of transportation.
      Teacher assigns small
      groups of students to
      calculate the costs and
      impact (advantages and
      disadvantages) of varied
      methods of transportation:
      automobile, buses, rail,
      monorail, elevated train,
      helicopter, light plane,
                (cont.)

II. Outside Resource and
    Community Activities
    A. Survey the number of
       empty seats in cars
       while traveling along
       a highway.
       1. The student will
          have to judge the
          carrying capacity
          of each car.
       2. After judging the
          capacity, how
          many empty seats
          were in each car?
       3. Total #1 & #2 and
          tabulate the
          results.
       4. Project this to a
          national average.
    B. Conduct a litter count.
       1. Determine cost of
          man hours to restore
          the area to its
          original condition.
       2. Extend this cost to
          the area of your
          city or state on an
          annual basis.

Resource and Reference Materials	Continued and Additional Suggested Lea
Publications:	I. (cont.)
	airplane, Saturn V.
	C. Determine the loss of earth's su
	cars of the metropolis.
Audio-Visual:	
Community:	

Lea	terials	Continued and Additional Suggested Learning Experiences

I. (cont.)
   airplane, Saturn V.
C. Determine the loss of earth's surface area to park
   cars of the metropolis.

s su

PROJECT I-C-E Episode Evaluation Form (Reproduce or

Please fill in:
Subject: _____

Grade: _____

Concept No. Used: _____

In commenting on each episode use
form. Feel free to adapt it and a⅃
your critiques and comments - negat
hand column, please rate (poor, goo
make specific comments or suggestic
vided to help us make this a more u

Poor	Good	Exc.	
			I. Behavioral Cbjectives A. Cognitive:
			B. Affective:
			II. Skills Developed
			III. Suggested Learning Experiences A. In Class:
			B. Cutside & Community Activities:
			IV. Suggested Resource & Reference Materials (specific suggestions & comments)

CT I-C-E Episode Evaluation Form (Reproduce or duplicate as needed)

In commenting on each episode used in your class, please use this form. Feel free to adapt it and add more pages. Let us know all your critiques and comments - negative and positive. In the left-hand column, please rate (poor, good, excellent) each item. Also, make specific comments or suggestions if possible in the space provided to help us make this a more usable guide. Thank you.

I. Behavioral Objectives
   A. Cognitive:

   B. Affective:

II. Skills Developed

III. Suggested Learning Experiences
   A. In Class:

   B. Outside & Community Activities:

V. Suggested Resource & Reference Materials
   (specific suggestions & comments)

Project I-C-E
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